ORDER

6540.7

TELEVISION MICROWAVE LINK (TML)
FOR DIGITAL BRIGHT RADAR INDICATOR TOWER EQUIPMENT (DBRITE)
PROJECT IMPLEMENTATION PLAN

October 16, 1992

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

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Initiated By: ANA-140

FOREWORD

This order defines responsibility for ensuring the orderly implementation of the Television Microwave Link (TML) project. This order provides management direction and technical guidance in the implementation of this project to all levels of the Federal Aviation Administration (FAA) from project inception through commissioning. The procedures and responsibilities described herein were developed using current agency directives.

Robert S. Voss
Program Manager for Terminal Automation ARTS IIA

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CHAPTER 1. GENERAL

1. PURPOSE. This order provides management direction and technical guidance in the implementation of the Television Microwave Link (TML) project to all levels of the FAA from project inception through commissioning. The order provides overall guidance and direction to involved organizations by establishing program management and project implementation, and defining organizational roles and responsibilities in support of project implementation. In addition to providing overall guidance and direction for implementation, this order also identifies and describes specific events and activities to be accomplished.

2. DISTRIBUTION. This order is distributed to the director level of the office of Associate Administrator for Airway Facilities; branch level to the offices of the Program Director for Automation, Acquisition Support, Training and Higher Education, Program Director for Communications and Aircraft Acquisition, Surveillance, Navigation and Landing, NAS Transition and Implementation, Systems Maintenance, NAS System Engineering, NAS Program Management, Research and Development, and Facility System Engineering Services; branch level at the FAA Technical Center Engineering, Test, and Evaluation Service, and the director level at the Mike Monroney Aeronautical Center; regional Airway Facilities division, and limited distribution to the Airway Facilities sector field offices.

3. DEFINITIONS AND ACRONYMS. The following is a list of acronyms used in this order.

AF	Airway Facilities
AFC	Automatic Frequency Control
AGC	Automatic Gain Control
APME	Associate Program Manager for Engineering
ARTS	Automated Radar Terminal System
AT	Air Traffic
ATC	Air Traffic Control
BRITE	Bright Radar Indicator Tower Equipment
CAI	Contractor Acceptance and Inspection
CCB	Configuration Control Board
CCD	Configuration Change Decision
CDG	Course Design Guide
CII	Communications International, Inc.
CM	Configuration Management
CO	Contracting Officer
COTS	Commercial-Off-The-Shelf
DBRITE	Digital Bright Radar Indicator Tower Equipment
dB	Decibel
DC	Direct Current
DRR	Deployment Readiness Review
DT&E	Developmental Test and Evaluation
EIA	Electronic Industries Association

EXCOM	Executive Committee
FAA	Federal Aviation Administration
FCA	Functional Configuration Audit
FRDF	Facility Reference Data File
FY	Fiscal Year
GFE	Government Furnished Equipment
IF	Intermediate Frequency
ILS	Integrated Logistics Support
ILSP	Integrated Logistics Support Plan
JAI	Joint Acceptance Inspection
JDL	Jordan De Laurenti, Inc.
LED	Light Emitting Diode
LRU	Line Replaceable Unit
LSAR	Logistic Support Analysis Record
MTP	Master Test Plan
N/A	Not Applicable
NAILS	National Airspace Integrated Logistics Support
NAILSMT	NAILS Management Team
NAS	National Airspace System
ORD	Operational Readiness Demonstration
OT&E	Operational Test and Evaluation
PAT&E	Production Acceptance Test and Evaluation
PC	Printed Circuit
PCA	Physical Configuration Audit
PM	Program Manager
PDSR	Program Director Status Review
RIG	Regional Integration Group
RF	Radio Frequency
SEI	Systems Engineering Integration
TBS	To Be Supplied
TIG	Terminal Integration Group
TIM	Technical Interchange Meeting
TML	Television Microwave Link
TO	Technical Officer
TOR	Technical Onsite Representative
TPRB	Test Policy and Planning Review Board

4. AUTHORITY TO CHANGE THIS ORDER. This order is issued under the authority of the Program Manager for Terminal Automation ARTS IIA, ANA-400; the Director, Air Traffic Plans and Requirements Service, ATR-1; and the Director, Air Traffic Rules and Procedures Service, ATP-1. The authority to issue changes to this order is reserved for the Program Manager for Terminal Automation ARTS IIA.

5. APPLICABILITY. The information contained herein will be used by FAA offices, services, regions, centers (Mike Monroney Aeronautical Center and FAA Technical Center), terminal sites, and contractor personnel for accomplishing their support of the TML system. The guidance and schedule information contained herein will form the framework for these organizations in the more

detailed planning activities required at the regional and field levels. Deviations from this order must be approved by the Program Manager for Terminal Automation ARTS IIA, ANA-400.

6. DURATION. The duration of this program will continue through the last TML site commissioning.

7.-19. RESERVED.

CHAPTER 2. PROJECT OVERVIEW

20. SYNOPSIS.

a. General. The TML contract is a turnkey installation of a wideband microwave link to be used to transmit bright radar indicator tower equipment (BRITE) data from hub site to remote towers. The contractor for the TML project is Communications International, Inc. (CII). The Digital BRITE (DBRITE) is a direct replacement for the present BRITE, and requires the Government to furnish a wideband TML system, fiber optic equipment or other approved remoting alternative as Government Furnished Equipment (GFE). For those locations where a remote BRITE system is currently installed, the existing TML will be used. For DBRITE installations where the remote service is being installed for the first time, the TML contract will provide microwave service for the DBRITE system.

b. Contractor activity. The TML contract calls for the contractor to perform TML site and path surveys; provide environmental assessment (EA) information to the Government so the EA can be prepared; determine that equipment is needed to provide a reliable TML path; acquire that equipment; and install and test the equipment and TML path. The contractor will provide, if required, antenna towers. This includes preparation of the foundation, standard shelters at repeater sites, foundation and fencing modifications, driveways (not roads), and identification of any specific site real estate, other than power and grounding that is required to establish a microwave path of the specified availability. The contractor will perform all engineering tasks and prepare data packages required for the Government to negotiate the use of proposed site real estate.

21. PURPOSE. To obtain TML's to transmit DBRITE data (from Automated Radar Terminal Systems (ARTS)) to remote satellite sites. These additional TML's will have logistics support from the FAA Logistics Center and training support from the FAA Academy.

22. HISTORY.

a. Operational Requirements. The Fiscal Year (FY) 1984 and FY 1985 budget contained projects to establish satellite radar service at new qualifying locations. DBRITE systems are being procured to provide the displays and the processing of data for those displays. A TML system is necessary to transmit this data from the central radar hub to the remote satellite sites. Since the new sites have no existing microwave link, the establishment of a new TML path is required. Without this equipment the new DBRITE sites cannot be established or implemented.

b. Contractual History. Previous TML systems were acquired locally by the region in which they were located. For this reason, a variety of equipment manufacturers were used to provide equipment, and there was no standard system. Support for these TML systems was generally at the local

level with minimal support provided by the FAA Logistics Center. Various regions have requested depot level support of the TML's, and the lack of standardization has caused problems. It was therefore determined that the requirement for additional TML systems to support future DBRITE sites would be satisfied on a national basis thereby providing logistics support. On September 29, 1989, the contract was awarded to CII, an 8(a) contractor in Atlanta, GA, to perform TML site and path surveys; determine what equipment is needed to provide a reliable TML path; acquire that equipment; install the equipment; test the equipment and TML path.

23.-29. RESERVED.

CHAPTER 3. PROJECT DESCRIPTION

30. FUNCTIONAL DESCRIPTION.

a. System. The TML system is acquired using a functional specification FAA-E-2446B, Specification for Television Microwave Link (TML), of the required equipment. The system shall be configured to have a propagation availability of 99.994 percent for each complete host site to satellite path, including paths with four or fewer repeaters. The system shall have a sufficient fade margin to support the path availability; the system shall have, at the output of the receiver at the satellite site, a signal to noise ratio of no less than 32 decibels (dB).

b. Radios. The radios will be wide-baseband, 7.125 - 8.5, 14.4 - 15.35, or 21.2 - 23.6 GHz point-to-point microwave system for relaying a high resolution, scan converted, composite televised radar display, in accordance with Electronic Industries Association (EIA) RS-343A, to a remote television monitor. The composite signal is derived from the 945-line, 30 frames/second scan converter equipment that is a part of the DBRITE system. The TML system provides relay of a DBRITE radar image from a source radar system to a remote television monitor location. The TML equipment configuration consists of wideband microwave equipment transmitting RS-343A television signals. A basic simplex terminal pair system consists of one transmitter and one receiver terminal, including antennas. Repeater terminals are used as determined by path surveys, and are configured similarly to a terminal pair. Repeater terminals also have DC power converters and back-up battery power systems to continue operation, without interruption, for 8 hours after loss of primary power. The simplex transmitter terminal, the simplex receiver terminal, and the simplex repeater each uses the following primary assemblies: baseband shelf; radio frequency (RF) shelf; branching shelf; interface panel; baseband/intermediate frequency (IF) patch panel. Repeater terminals have DC power converters and a back-up battery power system in a separate rack. The dehydrator and pressure manifold shall be rack, wall or floor mounted as determined by site specific requirement. The TML system shall have an equipment mean time between failures for each terminal pair or each repeater site of not less than 10,000 hours.

(1) Transmitter Terminal. This terminal provides one simplex transmitter terminal capable of transmitting the wideband video DBRITE signal. A typical rack consists of the following major assemblies: baseband shelf, IF/baseband patch panel (optional), RF shelf, branching shelf, and a power supply with interface panel. As is depicted in figure 3-1, these shelves and assemblies are modular to allow for ease in maintenance. A system fault light emitting diode (LED) that occurs at one site will not be seen at adjoining repeater, transmitter, and receiver sites.

(a) Baseband Shelf. This shelf conditions the incoming DBRITE video signal and provides system monitoring and control functions. This shelf

also provides DC power for the signal processing modules. The following modules are contained in the simplex transmitter terminal baseband shelf:

1 Transmit Video Module. Video inputs enter the transmit terminal through the customer interface panel and are routed through the baseband/IF patch panel. The video signal is then sent to the transmit video module where the signal is amplified and filtered to provide an output signal level that will directly modulate the transmitter RF head. A video signal alarm will be sent to the system monitor module when a loss of video signal occurs. This alarm will appear as a lighted LED on the system monitor module at the transmitter site. This alarm does not necessarily indicate a fault with the transmit video module, but does provide useful troubleshooting information.

2 System Monitor Module. This module provides both control and transmitter performance monitoring functions. The following transmit functions can be monitored from the front of this module:

(aa) RF transmit power.

(bb) Power amplifier output power (if equipped).

(cc) Automatic frequency control (AFC) volts.

(dd) Video presence detector volts.

(ee) Baseband shelf power supply voltages.

In addition to monitoring voltages, this module will light a system fault LED on the system monitor module at the site in the event any of the following alarm conditions exist:

(ff) Loss of transmit RF power.

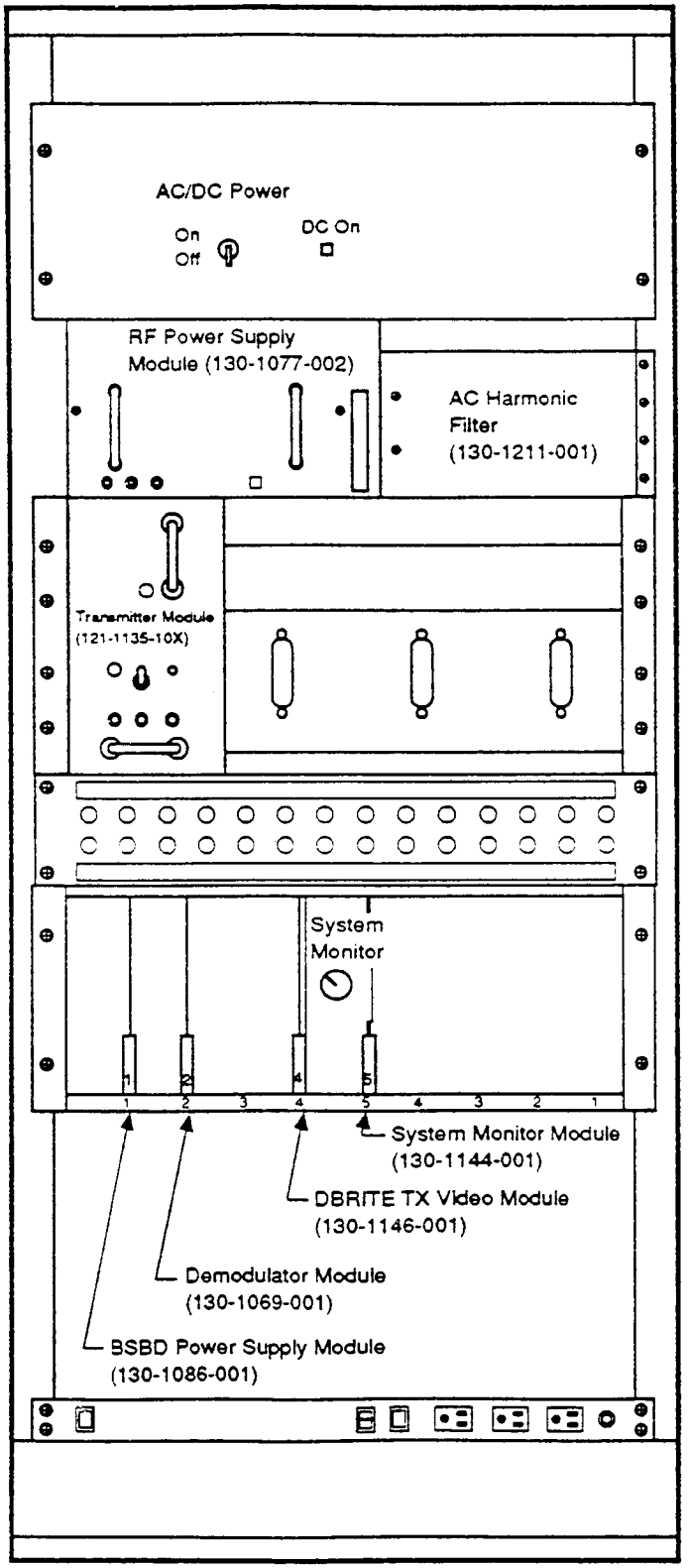
(gg) Loss of power amplifier output power (if equipped).

(hh) Loss of transmitter phase lock (AFC).

(ii) Loss of baseband shelf power supply voltages.

3 Baseband Power Supply Module. The power supply is mounted on a slide-in printed circuit (PC) card that plugs into the baseband shelf. It provides all of the DC power requirements of the baseband shelf.

FIGURE 3-1. FRONT VIEW TML TRANSMITTER RACK



(b) RF Shelf. This shelf provides the housing for the transmitter RF head module. The DC power requirements for the RF head module is partially derived from the baseband power supply module and partially from the RF power supply located within the branching shelf. The RF head module receives the processed composite video baseband signal and frequency modulates this signal onto an RF carrier. The process involves frequency modulation, RF power amplification, frequency multiplication, and frequency tuning and stability control. The module contains several alarms and test points on the face plate. These alarms and test points provide for the following parameter checks:

1 AFC volts.

2 RF power monitor.

3 RF frequency sample (samples AFC reference voltage).

The module also provides a signal to the following LED indicators on the transmitter interface/AFC card at the site:

4 Frequency High LED (red).

5 Phased Lock LED (amber).

6 Frequency Low LED (red).

7 Fault LED (red).

Additionally, the RF head issues an alarm fault signal to the system monitor module when there is either a loss of RF power or a loss of AFC phase lock. A summary alarm indication is also displayed on the front panel of the RF head module at the site.

(c) Branching Shelf. The branching shelf provides the duplexing arrangement required to couple the RF head module to the antenna system. In its most basic form, it contains only the RF channel filter. The assembly can be expanded to include either 1/2 or 5 watt power amplifiers as optional configurations. The shelf also contains the RF power supply and the RF filter required by the RF head.

(2) Receiver Terminal. This terminal provides one simplex receiver terminal capable of receiving the wideband video DBRITE RF signal. The basic configuration of a typical receiver rack is displayed in figure 3-2. A typical rack consists of the following major assemblies: a branching shelf, an RF shelf, and a baseband shelf. A system fault LED that occurs at one site will not be seen at adjoining repeater, transmitter and receiver sites.

(a) Branching Shelf. This shelf provides the duplexing arrangement required to couple the RF received signal from the antenna system

to the receiver RF head module. As in the branching shelf of the transmitter terminal, the assembly contains RF head power supply module and the receiver RF filter.

(b) RF Shelf. This shelf provides the housing for the receiver RF head module. The DC power requirements for the RF head are partially derived from the baseband power supply module and partially from the RF head power supply module. The receiver RF head receives the incoming RF signal, down-converts this modulated signal, and then the IF signal is filtered and amplified. The receive functions provided by this module include: RF down-conversion, IF filtering and amplification, local oscillator generation, automatic gain control (AGC) for the IF amplifier, and alarm and monitoring circuits. The following test voltages and fault indicators are located on the front panel at the site.

1 AFC VOLTS - indicates the condition of the local oscillator frequency.

2 SIGNAL STRENGTH - provides relative indication of receive signal strength.

3 AFC DISABLE - allows the AFC to be disabled so that the received frequency can be changed as required.

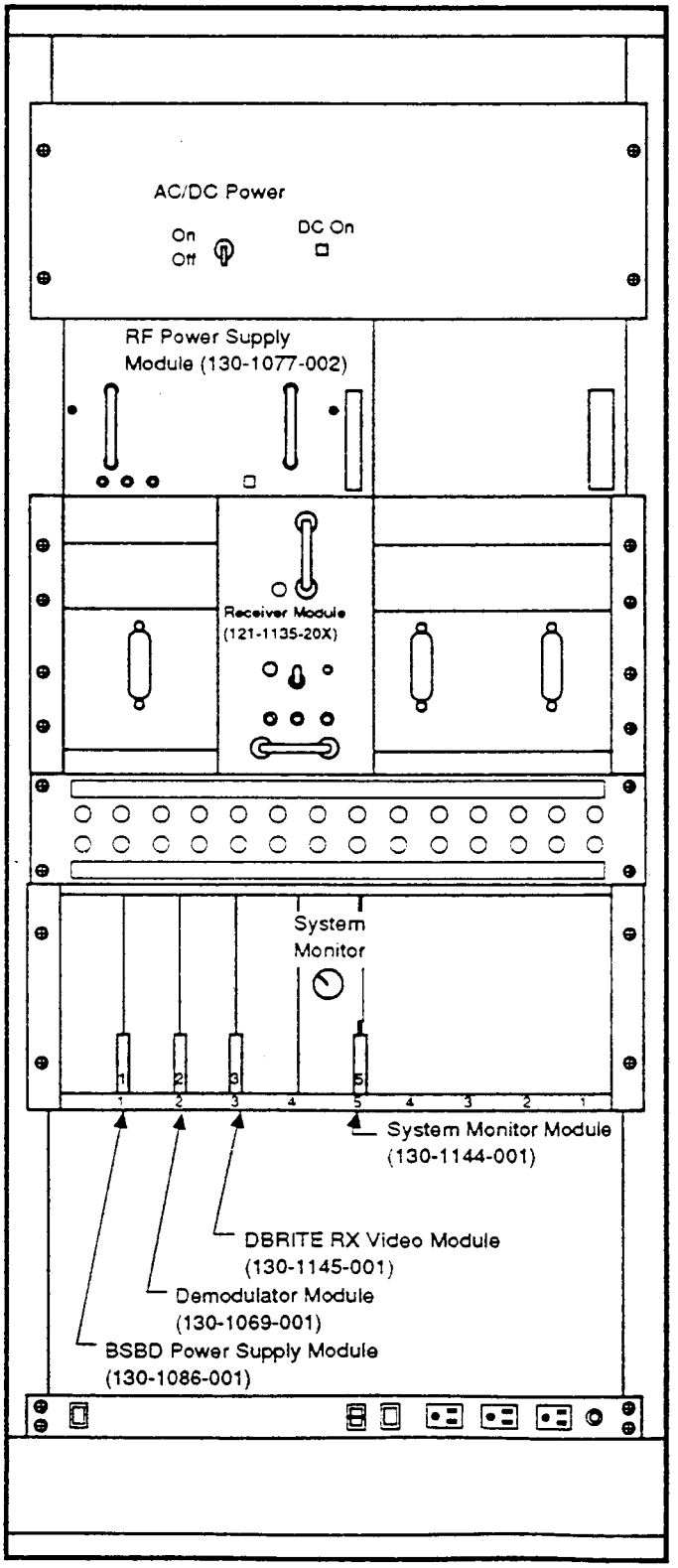
4 RX FAULT - provides an LED indication of local oscillator loss of AGC lock and level.

Additionally, the AFC interface/fault detector PC board provides an alarm interface to the RF head front panel and to the system monitor module.

(c) Baseband Shelf. This shelf is the same shelf described in subparagraph 30b(1)(a) except the modules have been changed to provide receiver terminal functions. The shelf demodulates the incoming IF signal and provides the AFC functions required by the RF head module. The following signal processing modules are contained on the shelf:

1 Demodulator/AFC Module. This module develops the AFC voltage required by the Receiver RF Head, and it demodulates the frequency modulated IF signal, producing a wideband video baseband signal.

FIGURE 3-2. FRONT VIEW TML RECEIVER RACK



2 Receive Video Module. This module de-emphasizes the entering wideband video baseband signal and filters high frequency noise from appearing at the output of the baseband module. After filtering, the composite video signal is processed by a video sync detector to determine whether pulse is present, if it is not, a fault alarm is issued through the system monitor module. Thereafter, the video baseband signal is amplified and routed through the baseband module.

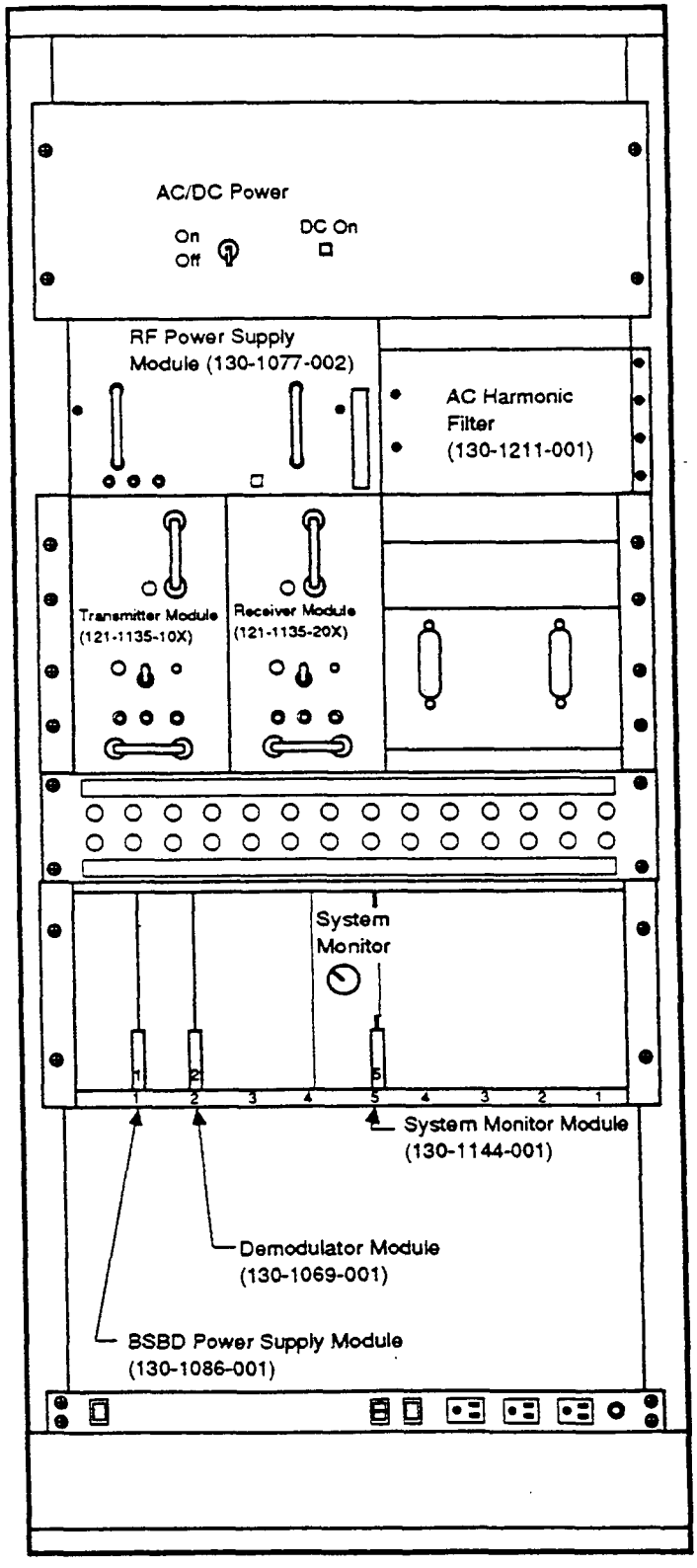
3 System Monitor Module. This module provides control and receiver performance monitoring functions. The module indicates system voltage and alarm status, with the following functions monitored on the front of the module at the site: receive signal strength; AFC volts; video presence detector volts; and all baseband shelf power supply voltages. Additionally, the module will issue a system fault if any of the following alarm conditions exist: loss of receive phase lock voltage; loss of video presence; or loss of baseband shelf power supply voltages.

4 Baseband Power Supply Module. The power supply is mounted on a slide-in PC card that plugs into the baseband shelf. It provides all of the DC power requirements of the baseband shelf.

(3) Repeater Terminal. The simplex repeater terminal is capable of receiving and re-transmitting the wideband video DBRITE signal. The repeater contains a branching shelf, an RF shelf, and a baseband shelf (see figure 3-3, TML repeater rack). The modules contained on these shelves are identical to the descriptions given in subparagraph 30b(1)(c)1 - 4. Additionally, the repeater terminal is equipped with DC power converters, and back-up batteries to provide 8 hours of continuous operation after the loss of primary power. A system fault LED that occurs at one site may not necessarily be seen at adjoining repeater, transmitter, and receiver sites.

(4) Antennas, Waveguide, and Related Equipment. In addition to the above mentioned terminals, the TML system includes all necessary waveguide, antennas, and when required, antenna towers and other associated hardware as specified by the Site and Path Survey Reports, CDRL Item A001. This equipment provides the capacity for transmission of the video signal from one terminal to another. This equipment is inherently reliable with failures normally occurring only from external, catastrophic influences. The dehydrator is a mechanical compressor-dehydrator that provides pressurized, dehumidified air to the waveguide. The dehydrator contains a system pressure regulator, system pressure gauge, and humidity indicator.

FIGURE 3-3. FRONT VIEW TML REPEATER RACK



31. PHYSICAL DESCRIPTION. A basic system will consist of one transmitting terminal and one receiving terminal, and will include power supplies, waveguide elements, branching networks, a bidirectional coupler for signal strength, and other associated equipment as necessary. A transmitting or receiving terminal will be contained in a single 19-inch open equipment rack, 72 inches in height, 16 inches in depth, and approximately 150 lbs in weight. Repeater terminals will be provided in addition to the basic systems for those sites requiring repeaters. A repeater terminal will also be contained in a single equipment rack, 72 inches in height and 16 inches in depth, and approximately 150 lbs in weight. At the repeater sites, the DC power converters and backup batteries will be located in a separate equipment rack of the same size as described, but weighing approximately 500 lbs. The batteries will be sealed and will not require ventilation. The repeater sites have adequate backup battery power to continue operation, without interruption, for 8 hours after loss of primary input power. Dry air pressurization equipment, if required, will be rack, wall, or floor mounted as determined by site criteria. All systems will operate from 110 volts 60 Hz. AC primary power. All equipment in the system shall operate continuously and withstand storage in the following ambient environment without damage or degradation of performance:

	Operating	Storage
Temperature, Degrees C	0 to +50	-40 to 70
Relative Humidity, Percent	5 to 90	0 to 95
Elevation, Feet	0 to 15000	0 to 40000

32. SYSTEM REQUIREMENTS. Not Applicable (N/A).

33. INTERFACES. The TML system will interface with the DBRITE digital scan converter equipment that will supply a standard EIA RS-343A composite picture signal to the TML transmitter and with the DBRITE television display equipment on the receiver side. The physical connection will be a standard BNC connector for a RG-59 coaxial cable. A maximum of 500 feet of cable is allowed between the TML receiver and the DBRITE television display equipment.

34.-39. RESERVED.

CHAPTER 4. PROJECT SCHEDULE AND STATUS

40. PROJECT SCHEDULE GENERAL AND STATUS. The contract for the TML project was awarded on September 29, 1989. Site and path surveys are being done at about three per month, to complete in October 1992. Installation at the FAA Technical Center was completed on the July 16, 1990, with shakedown and integration testing to be completed during September 1991. Shakedown testing at Macon, GA, was completed January 24, 1992. A cost benefit analysis for TML versus fiber optics or any other approved remoting alternatives will be performed for each of the candidate site. Installation of field sites will occur at two per month, starting in June 1992. The uncompleted activities are dynamic, interrelated, and subject to change. Updates to this table will be provided periodically by ANA-400.

41. MILESTONE SCHEDULE SUMMARY.

Site Location	Survey Date	Installation Date
FAA Technical Center	11/11/90	07/90 completed
FAA Academy, OK	03/27/90	08/91 completed
Macon, GA	12/08/89	10/91 completed
Rome, NY	08/10/90	10/92
Alliance, TX	05/31/91	11/92
Key West, FL	02/01/90	12/92
San Antonio, TX	03/27/90	01/93
Lawton, OK	04/06/90	02/93
Jacksonville, FL	01/11/90	03/93
Jackson, MS	01/18/90	03/93
Tacoma Narrows, WA	06/08/90	04/93
Renton, WA	05/25/90	04/93
Morristown, NJ	08/22/91	05/93
Caldwell, NJ	08/22/91	05/93
Centennial, CO	11/13/91	06/93
Jefferson County, CO	11/12/91	06/93
Buckley, CO	11/04/91	06/93
Hillsboro, OR	05/11/90	07/93
Ogden, UT	06/08/90	07/93
San Juan, PR	02/13/90	08/93
Dallas NAS, TX	05/09/91	08/93
Grand Forks, ND	06/29/90	09/93
Rapid City, SD	06/29/90	09/93
Aurora, IL	09/07/90	10/93
Front Range, CO	11/05/91	10/93
Spokane, WA	05/18/90	11/93
Everett, WA	05/10/91	11/93
Fort Worth A, TX	00/00/00	12/93
Fort Worth B, TX	00/00/00	12/93

Site Location	Survey Date	Installation Date
Falcon, AZ	04/20/90	01/94
San Diego, CA	04/20/90	01/94
Reid-Hillview, CA	00/00/00	02/94
San Francisco, CA	00/00/00	02/94
Concord, CA	09/28/90	03/94
El Monte, CA	10/19/90	03/94

42. INTERDEPENDENCY AND SEQUENCES. The preceding list of sites indicates a tentative order for installation. This list is subject to change as site peculiar issues occur. The sequence which must take place to be prepared for a site installation is as follows:

a. The region and the contractor participate in site survey activities.

b. The contractor submits a Site and Path Survey Report and Site Equipment Selection Report for the particular path to the FAA. (Approximately 45 days after completion of the site survey.)

c. The Site and Path Survey Report and Site Equipment Selection Report for the specific path is distributed to the responsible regional office. (Within 10 days of the receipt of the report from the contractor).

d. The region comments to the Associate Program Manager for Engineering (APME), Terminal Automation Program (ANA-140) on the engineering solution proposed by the contractor (within 30 days of delivery of the documents to the region). Any comments are resolved. The Site and Path Survey Report and Site Equipment Selection Report are approved by the contracting officer and formal acceptance is sent to the contractor. The region is authorized to initiate real property negotiations after project authorization and as required by the Site and Path Survey Report, and request the frequency authorization upon receipt of formal notification of an approved Site and Path Survey Report and an approved Site Equipment Selection Report by ANA-140.

e. The regional Spectrum Management Officer initiates an engineering and assignment action for each link frequency required based on information provided by the contractor through ANA-140 and processes the same through established channels. Approximately 60-90 days are required to receive frequency assignment approval from the National Telecommunications and Information Administration, the approval authority for all Federal Government frequency assignments.

f. The contractor submits the installation document and site test plan for the site to the FAA for approval.

g. The installation documents are distributed by ANA-140 to the responsible regional office for further dissemination to the particular site.

h. The region comments to ANA-140 on the proposed installation plan. ANA-140 resolves region comments with contractor. Contractor delivers final documents to ANA-140. The final installation document and site test plan for a specific site are approved by the contracting officer and formal acceptance is sent to the contractor.

i. Before the site installation can occur, the region must ensure that all real property negotiations have been closed and site preparation has been completed and coordinated through ANA-140.

j. Any security requirements of a site must be satisfied by the contractor, with the assistance of the region, prior to delivery of the equipment. The contractor will investigate to see if any special building or site permits are necessary to install the TML equipment at the TML sites. The installation document submitted by the contractor (60 days before site installation) will include a list of all necessary permits. The review of the installation document should include verification by the region that all necessary building or site permits (such as on Air Force Bases) are called out in the installation document.

43.-49. RESERVED.

CHAPTER 5. PROJECT MANAGEMENT

50. PROJECT MANAGEMENT, GENERAL. Project management of the TML project is the responsibility of ANA-140. The program manager (PM) of the DBRITE-TML projects is ANA-400. The PM will ensure that the contractor has access to technical documentation required to complete the project. The PM has designated a technical officer (TO) within ANA-140, to provide technical guidance and direction to the contractor within the scope of the contract. In support of the projects, a contracting officer (CO) was designated by Office of Acquisition Support, ASU-350 to perform the general contract management activities to ensure that the terms of performance under the contract are met. The CO is the only person authorized to make changes affecting prices, deliverables, or schedules. Management and technical support to the PM and TO is provided by the System Engineering and Integration (SEI) contractor.

51. PROJECT CONTACTS. Appendix 1, page 1, provides a listing of project management personnel designated as contacts for their respective organizations.

52. PROJECT COORDINATION. Coordination between FAA organizational elements is required to fulfill assigned responsibilities. The following paragraphs list the organizational elements requiring coordination and their respective responsibilities in support of the projects.

a. Washington, D.C. The following organizations within FAA headquarters, Washington, D.C, will fulfill the indicated project responsibilities:

(1) Program Manager for Terminal Automation ARTS IIA (ANA-400).

(a) Provides technical guidance and direction to the contractor in the selection, installation, and testing of the hardware and ensure all technical contract requirements are met.

(b) Provides guidance to all offices, services, centers, and regions on project implementation. This includes, but is not limited to:

1 Site installation.

2 Provisioning.

3 Updates to maintenance concept.

4 Training.

5 Configuration management (CM).

6 Documentation deliverables.

7 All test phases.

8 Operational Readiness Demonstration (ORD)

(c) If applicable, manages project interdependencies with interfacing projects.

(d) Serves as a member of the ANA Configuration Control Board (CCB).

(e) Leads the Deployment Readiness Review (DRR) Team, develops the DRR report, provides a briefing to the DRR Executive Committee (EXCOM) assessing deployment readiness, and recommends deployment when appropriate.

(f) Ensures the availability of funds and keep the contract within budget limitations.

(2) Automation Engineering Division (ANA-100).

(a) Provide technical guidance and direction to the contractor in the selection, installation, and testing of the hardware and ensure all technical contract requirements are met.

(b) Provide guidance to all offices, services, centers, and regions on project implementation. This includes, but is not limited to:

1 Site installation.

2 Updates to maintenance concept.

3 Training.

4 CM.

5 Documentation deliverables.

6 All test phases.

7 ORD.

8 Support the DRR process.

(c) Establish and chair project working groups as required.

(d) Serve as a member of the ANA CCB.

(e) Prepare the Master Test Plan (MTP) jointly with the Engineering Test and Evaluation Service (ACN).

(f) Chair the National Airspace Integrated Logistics Support Management Team (NAILSMT).

(g) Serve as a member of the Test Policy and Planning Review Board (TPRB).

(h) Conduct the Functional Configuration Audit (FCA) and Physical Configuration Audit (PCA).

(3) National Airspace Integrated Logistics Support Implementation (NAILS) Branch (ANS-420).

(a) Integrate TML logistics efforts with the National Airspace System (NAS) program.

(b) Initiate and maintain an effective supply support procedures.

(c) Initiate and execute an effective provisioning program.

(d) Verify Integrated Logistics Support (ILS) activities conform to the contract requirements.

(e) Review development of logistic support data.

(f) Support the DRR process.

(4) National Engineering Field Support Division (ASM-600).

(a) Provide input to Operational Test and Evaluation (OT&E) requirements.

(b) Support the DRR process.

(c) Serve as a member of the TPRB.

(d) Develop system OT&E/shakedown requirements.

(e) Develop OT&E/shakedown test plan and procedures in accordance with FAA-STD-024A, Preparation of Test and Evaluation Plans and Test Procedures.

(f) Conduct OT&E/shakedown testing, at an operational site, perform data analysis and prepare reports.

(g) Support OT&E/shakedown testing at the FAA Technical Center in accordance with program manager and program directive.

(h) Serve as a member of the ANA CCB.

(i) Provide maintenance support.

(j) Coordinate system certification at the sites.

(k) Serve as member of project working groups established by ANA.

(l) Ensure execution of an effective provisioning program in conjunction with Office of Acquisition Support (ASU) and the Mike Monroney Aeronautical Center (AAC).

1 Co-chair NAILSMT.

2 Verify ILS activities conform to the contract requirements.

3 Review development of logistic support data.

(m) Provide engineering feedback to ANA-140 for correction of system or equipment deficiencies for the installed systems.

(n) Provide CM of hardware.

(o) Support the FCA and PCA.

(5) Air Traffic Procedures Service (ATP-100).

(a) Assist in the development of OT&E/integration plans with ANA, regions, and FAA Technical Center.

(b) Ensure that all operational aspects of system implementation are satisfactorily dealt with by the regions prior to site implementation.

(c) Provide technical coordination and support to ANA-140 on air traffic control (ATC) functions, hardware configuration, and operational requirements which interface with associated terminal systems.

(d) Update the operations and procedures handbooks as may be necessary.

(e) Provide Air Traffic (AT) Requirements and Certification, AHT-400, with any special training requirements.

(f) Serve as a member of the ANA CCB.

(g) Serve as a member of project working groups established by ANA.

(h) Support the DRR process.

(6) Air Traffic Plans and Requirements Service (ATR-100).

(a) Provide input to OT&E requirements.

(b) Serve as a member of the TPRB.

(c) Prepare training proposals; review and approve all associated training schedules, assignments, programs, and training plans from a technical and operational standpoint.

(d) Instruct and advise regions on training programs, schedules and assignments.

(e) Serve as a member of the ANA CCB.

(f) Support OT&E/shakedown testing at the FAA Technical Center in accordance with program manager program directive.

(g) Support the DRR process.

(h) Support the FCA and PCA.

(7) System Engineering and Integration (SEI) contractor. The SEI contractor is responsible for program support in the following areas:

(a) Assist in the preparation of procurement packages for the systems and subsystems.

(b) Assist in reviewing contractor technical proposals for the systems and subsystems.

(c) Monitor the system and subsystem design and the status of system and subsystem technical activities.

(d) Provide technical assistance in the review and evaluation of the system and subsystem designs, production and test; and perform analyses of technical problems as desired.

(e) Plan, schedule, and monitor activities associated with field installation of systems and subsystems.

(f) Support the CM process.

(g) Provide technical assistance in the review and development of training policies, programs, standards, systems and procedures.

(h) Provide technical support in the execution of an effective provisioning program.

(i) Provide support to logistics organizations.

(j) Support the FCA and PCA.

(k) Support the DRR process.

(8) Material Management Division (ASM-720).

(a) Integrate TML logistics efforts with the NAS program.

(b) Initiate and maintain an effective supply support procedures.

(c) Initiate and execute an effective provisioning program.

(d) Ensure an effective training program is employed.

(e) Provide policy and procedural guidance to regional Airway Facilities (AF) divisions and AAC for appropriate property controls prior to certification.

(f) Serve as a member of project working groups established by ANA.

(g) Serve as a member of the ANA CCB.

(h) Support the DRR process.

(i) Provide support to test and evaluation (T&E) parameters for incorporation in shakedown testing.

(j) Serve as a member of the TPRB.

(9) NAS Systems Engineering Service (ASE).

(a) Provide NAS system level requirements for T & E.

(b) Verify compliance with NAS system level and OT&E requirements.

(c) Serve as a member of the ANA CCB.

(d) Coordinate test policy waivers.

(e) Verify compliance with Order 1810.4A, FAA NAS Test and Evaluation Program.

(f) Provide guidance and direction on the conduct of FCA and PCA.

(g) Support the DRR process.

(10) Airway Facilities Training Program Division (AHT-400).

(a) Develop and recommend technical training policies, programs, standards, systems and procedures to meet FAA program requirements, applicable Federal laws, and Office of Personnel Management and Department of Transportation regulations.

(b) Administer technical training programs and policies.

(c) Evaluate the technical training programs and ensure that measures are taken to correct deficiencies.

(d) Provide training programs.

(e) Develop, operate, and maintain a management information system.

(f) Support the DRR process.

(11) Office of Acquisition Support, Industrial Division (ASU-400) Provide test support to ANA-140 during factory acceptance testing.

b. Field Organizations. The responsibilities of the FAA Technical Center, regions and other field organizations is as follows:

(1) FAA Technical Center (ACN-200) will provide the support necessary to test and evaluate the project for functional and operational performance and for compliance with the contract requirements. ACN will perform these duties in accordance with Order 1810.4A which designates ACN as the test director. Accordingly, ACN will designate a test director for the projects. ACN will also:

(a) Develop OT&E/integration requirements for each subsystem (project) in coordination with AT, AF, other user organizations, and acquisition program managers.

(b) Prepare testing program directives and coordinate agreements with ATR/Associate Administrator for NAS Development/Associate Administrator for Airway Facilities/ASU.

(c) Prepare the MTP in accordance with Order 1810.4A which designates the roles of testing in system implementation.

(d) Prepare test monitor guidelines; prepare OT&E/integration test plans and test procedures in accordance with FAA-STD-024A; and prepare/concur on Developmental Test and Evaluation (DT&E) test plans and procedures.

(e) Direct the conduct of DT&E, OT&E/integration, production acceptance test and evaluation (PAT&E); conduct DT&E and OT&E/integration data analysis, and prepare reports.

(f) Support ASE in development of NAS system-level requirements for T&E.

(g) Support acceptance testing at the first field site in accordance with PM program directive.

(h) Maintain the status of test progress and test problems.

(i) Present reviews to the PM, as required.

(j) Serve as a member of the CCB, as required.

(k) Operate and maintain NAS subsystems delivered to the FAA Technical Center after FAA acceptance of the equipment.

(l) Provide for facility readiness.

(m) Maintain project documentation in accordance with Order 1750.6, NAS Documentation Facility.

(n) Establish initial training requirements for FAA Technical Center personnel and coordinate with Maintenance Operations Division, ASM-200.

(o) Establish financial and item management control and accountability for all agency property received at the FAA Technical Center.

(p) Support the DRR process through deployment recommendations to the DRR EXCOM.

(2) Mike Monroney Aeronautical Center.

(a) FAA Logistics Center (AAC-400):

1 Accomplish cataloging and provisioning for equipment.

2 Provide supplies and working equipment for each facility receiving equipment.

3 Provide national project material which is not procured by ASU.

4 Develop, in conjunction with ASU and ANA-140, logistics policies and plans for support of a system.

5 Participate in planning activities for the transition of system equipment into the logistics inventory.

6 Participate, as requested by Director of Office of Training and Higher Education, AHT-1, in the review of instruction books.

7 Support the DRR process.

(b) FAA Academy (AAC-900):

1 Develop, monitor, and conduct training programs as directed by AHT-1.

2 Preliminary acceptance of items delivered to the FAA Academy under the contract.

3 Ensure timely selection of necessary instructors and maintenance personnel to meet AAC's training and staffing requirements.

4 Support the DRR Process.

(c) Facility Support Division (AAC-50):

1 Adapt national engineering specifications to local conditions and perform engineering services within nationally provided guidelines for the installation, inspection, and acceptance of the system, including subsystem components, at the FAA Academy.

2 Provide for technical supervision of onsite activities performed under the contract at the AAC.

(3) Regions. Each region has appointed a regional project manager (see appendix 1, page 1). The regional project manager will ensure that facilities and engineering work, if required, is completed prior to the delivery of hardware. The project manager will monitor installation and coordinate requests for contractual or technical support with ANA-140 and the National Engineering Field Support Division, ASM-600. The project manager at each region will arrange for the appointment of a technical onsite representative (TOR) at each facility. The regions will fulfill the following responsibilities:

(a) Perform site preparation and monitor installation in accordance with schedules provided in chapter 4, paragraph 41. Coordinate with ANA and AAT on any changes to these schedules.

(b) Assign a Regional Integration Group (RIG) to provide for coordination, direction, and guidance necessary for effective and timely implementation of the project. The RIG will be chaired by the regional project manager and will be comprised of regionally selected AT and AF personnel knowledgeable in implementation of automation programs. The RIG will be responsive to the guidance and direction of the region for monitoring the efforts at each site within the region. The RIG is to monitor and provide assistance and guidance in all phases of the terminal automation implementation for all regional sites.

(c) Designate a TOR to serve at each terminal facility. The TOR provides the regional coordination, direction, and guidance necessary for effective and timely accomplishment of site preparation functions during the terminal automation implementation at the site to which he/she is assigned. This includes onsite decision-making and day-to-day problem-solving. The TOR is to be the principal onsite regional representative who reports problems, progress, and other matters to ANA-140 through appropriate regional representatives. The TOR is to be guided by approved test documentation and the project implementation plan. Established channels of communications between regions and ANA-140 are to be used in carrying out the terminal automation program. The TOR is also to serve as a member of the RIG and Terminal Integration Group (TIG).

(d) Serve as a member of the TIG at each site. The TIG is to be comprised of designated onsite regional AT and AF personnel experienced in the implementation of electronic and/or automation systems. The TIG will be designated no later than 90 days prior to shipment of the respective site. The TIG will be responsive to the guidance and direction of the TOR. Personnel assigned to the TIG are to be engaged in test activities subsequent to Initial Operational Capability (IOC).

(e) Provide regional logistics requirements to AAC and ANA-140.

(f) Support the development of test plans and procedures for integration and shakedown testing.

(g) Conduct site acceptance testing at each TML site in the region.

(h) Conduct and/or monitor site acceptance testing.

(i) Conduct the ORD and commissioning.

(j) Support ACN during OT&E/integration testing.

(k) Conduct operations changeover testing in accordance with the requirements of the test plans for these functions.

(l) Develop the required environmental and "as built" records.

(m) Ensure that appropriate FAA/military local onsite agreements are reached.

(n) Ensure that real estate agreements are reached to allow installation of TML repeaters on non-FAA property. The region will provide legal descriptions of property as needed to negotiate the use of a selected location.

(o) The region will provide the contractor with data used by the region to evaluate seismic conditions.

(p) Conduct the formal certification exercise (commissioning) for designated terminal facilities.

(q) Establish financial and item management control, and accountability for all agency property received in the region.

c. Project Support Organizations.

(1) Configuration Control Board (CCB). In accordance with Order 1800.8F, National Airspace System Configuration Management, the CCB is the official body authorized to approve or disapprove system baselines and changes to these baselines. There is a central NAS CCB to establish and control baselines and to administer configuration control. From this CCB, authority is delegated to lower-level CCB's to effectively administer proposed changes at the most appropriate level. All lower-level CCB's will be accountable to the NAS CCB which has been established through a charter defining its authority, responsibilities (including the specific documents over which the CCB has control), and membership. Decisions and directives are documented in Configuration Control Decisions (CCD), which either approve, disapprove, defer, or refer the change request to another CCB. When contractual action is required, the CCD serves as a basis for preparation of a procurement request which is submitted to the CO. The CCD may also be distributed to other Government agencies and serves as an official notification of CCB action. Representation on the CCB include the various agency services/offices that have responsibilities to acquire, support, and operate the system. Representatives of other organizations may be invited to attend as required.

(a) Air Traffic Plans and Requirements Service (ATR).

(b) Air Traffic Rules and Procedures (ATP).

(c) Program Director for Automation (ANA).

(d) Systems Maintenance Service (ASM).

(e) NAS Systems Engineering Service (ASE).

(f) SEI contractor.

(g) Office of Acquisition Support (ASU).

(2) Deployment Readiness Review (DRR) EXCOM Board. In accordance with Order 1800.63 the EXCOM DRR Board receives from the project manager a DRR Report containing operational and contractual requirements that have not been met, if any. The Chairman EXCOM DRR Board is the official authorized to approve or disapprove deployment of the subsystem/system into the NAS. Representatives on the EXCOM DRR Board include the agency services/offices that are responsible for acquisition, support, and operation of the system. Other representatives may be invited to attend as required. ACN will provide the results of OT&E testing and a deployment recommendation to the DRR EXCOM.

(a) Air Traffic Plans and Requirements (ATR).

(b) Program Director for Automation (ANA).

(c) Systems Maintenance Service (ASM)

(d) NAS Transition and Implementation Service (ANS).

(e) SEI contractor.

(f) Office of Air Traffic System Management (ATM).

(g) Associate Administrator for NAS Development (AND).

(h) Associate Administrator for Airway Facilities (AAF).

(i) Mike Monroney Aeronautical Center (AAC-1).

(j) Regional Airway Facilities Division (AXX-400).

(k) Sector Manager-lead site.

(l) AHR.

53. PROJECT RESPONSIBILITY MATRIX. The following table is provided to define the activities and associated responsibilities:

TASK/PLAN/ACTIVITY	PRIMARY OFFICE	SUPPORTING OFFICES
Implementation Schedule	ANA-140	Regions

Training Programs	AHT-400	ATR, ANA-140
Schedules and Assignments	ASM-200, AHT-400/500	AAT, Regions, AAC, ASM-600
Configuration Management (Hardware)	ASE ASM	ASM-600, ATR, ATP, Regions, ANA
TML Master Test Plan	ACN-260/ ANA-140	ASM-600, ATR, ATP, Regions
OT&E/Integration Test Plan and Procedures	ACN-260	ANA-140 ASM-600
OT&E/Shakedown Test Plan	ASM-600	ANA-140, ATP, ATR-560 Regions, ACN-260
OT&E/Shakedown Test Procedures	ASM-600	ANA-140, ATP, ATR FAA Technical Center
Operations Changeover Plan	Regions	ASM-600, ATR, ATP
Disposition of Excess Equipment Plan	ANA-140	AAC, Regions, AAF
Logistics Support Planning	AAC/ANS	ANA-140, ASM-200, Regions
ORD Test Plan/Procedures	Regions	ATR, ASM-400
DRR Process Milestones	ANA-400	AAF-11/SEI Contractor

54. PROJECT MANAGERIAL COMMUNICATIONS. Project managerial communications are provided bimonthly to ANA-1 through a Program Director's Status Review (PDSR). This PDSR provides insight into cost, schedule, technical, contractual, and logistics issues that may exist. Communications to the various branches of ATR, ATP, AAC, FAA Technical Center, the regions and other ANA organizations occurs formally through Technical Interchange Meetings (TIM) that are initiated during all stages of the program.

55. IMPLEMENTATION STAFFING. Staffing peculiar to implementation of the projects includes assignment of regional project managers, RIG, TOR's, and TIG's. Responsibilities of these persons and groups are defined in paragraph 52b.

56. PLANNING AND REPORTS.

a. Reports.

(1) The Program Director's Status Review provides bimonthly information to FAA upper management on cost, schedule, and technical status of the projects.

(2) The DRR Report documents the results of the deployment readiness process and provides recommendations to the EXCOM DRR Chairman.

(3) The OT&E/Shakedown Test Report documents the results of the FAA Technical Center OT&E/shakedown test activity, the operational effectiveness/suitability of the TML in the NAS, and the readiness of logistics training, maintenance, and the support functions related to the TML.

(4) The OT&E/Integration Report documents the verification of project defined operational requirements, the validity of the TML and DBRITE remote display, baseline performance and operational effectiveness/suitability.

(5) Annotated DRR Checklist provides monthly status of the TML Project prior to EXCOM only.

b. Plans.

(1) The Master Test Plan defines the T&E program for the project and provides a framework for the systematic T&E of the system to ensure that all functional and performance requirements are satisfied.

(2) The OT&E/Shakedown Test Plan defines tests of the system in an operational environment to assess the readiness of people, procedures, and the system to assume field operational status.

(3) The OT&E/Integration Test Plan defines testing to be accomplished for assessing the operational suitability and operational effectiveness of the system, the integration test requirements between an existing NAS system (DBRITE) and a new NAS system (TML) and the measurement of the baseline operational characteristics of the TML.

(4) The Training Plan defines those training activities to be accomplished to ensure personnel are qualified before participation in site or system certification.

(5) The Site Shakedown Test Plans define the tests required to confirm the integrated readiness of people, procedures, and the system to assume field operational status.

(6) The Integrated Logistics Support Plan (ILSP) defines the elements of the NAILS Program applicable to the projects. The ILSP also describes the maintenance concept to be applied.

57. APPLICABLE DOCUMENTS. See Appendix 2, List of Documents.

58.-59. RESERVED.

CHAPTER 6. PROJECT FUNDING

60. PROJECT FUNDING STATUS, GENERAL. The regions will provide the TML project office with a cost estimate for the site preparation and acquisition of real estate for those locations with approved TML surveys. The program office will provide the regions with reasonable project funding as identified on the cost estimate.

61.-69. RESERVED.

CHAPTER 7. DEPLOYMENT

70. GENERAL DEPLOYMENT ASPECTS. Deployment planning is a site specific activity due to each site's unique requirements. The contractor will install the TML equipment at Government designated sites. The regional F&E personnel are required to provide power drops and space for equipment racks.

71. SITE PREPARATION. The contractor shall perform all labor required to prepare the TML sites for delivery of system and installation of the system. The Government shall provide power drops, including any additional power requirements for heated radomes, space for equipment racks, and removal of any hazardous materials (such as asbestos) as required. Site preparation must include a measurement of the station ground at each TML transmitter, receiver, and repeater site to establish a site ground measurement for each site. No other work or materials are to be required of the Government or any FAA personnel. The FAA will provide the power to the input side of the shelter power main breaker box. The following electrical outlets, circuit, and grounding needs to be provided by the FAA at TML microwave sites:

a. Transmitter and Receiver Sites. A total of three independent circuits, each protected by a dedicated circuit breaker (amperage will be provided in each site installation document) is to be provided by the FAA. Two circuits should be made available above the microwave radio rack via a single section of flexible conduit. This will provide the hard-wiring to the terminal block located at the top of the rack. Of the two circuits, one will power the convenience outlets located at the bottom of the rack and one will power the microwave radio equipment within the rack. The third circuit should terminate into a standard duplex outlet near the mounting location of the dehydrator. In most cases, this outlet box will be wall mounted (refer to the installation document for further detail).

b. Repeater Sites. A total of four independent circuits, each protected by a dedicated circuit breaker (amperage will be provided in each site installation document) is to be provided by the FAA. One circuit should be made available above the microwave radio rack via a single section of flexible conduit. This will allow for hard-wiring to the terminal block at the top of the rack. This circuit will power the convenience outlets located at the bottom of the rack. Since the repeater operates from -48 volts DC, as provided by the Ascom Warren battery equipment, no other 110 VAC power circuit is required within the repeater rack. Additionally, two circuits should be made available to the Ascom Warren -48 VDC power rack via two sections of flexible conduit. One will allow for hard-wiring to the terminal block inside the rectifier housing in the midsection of the rack. The other circuit, along with flexible conduit, should terminate into a junction box at the top of the rack. This circuit will power the convenience outlets located at the bottom of the rack. The fourth circuit should terminate into a standard duplex outlet box near the mounting location of the dehydrator. In most cases, this outlet box will be wall mounted. In instances where multiple repeaters are co-located, the complement of electrical circuits should be four for each

repeater. For example, where two repeaters are co-located, eight circuits would be required. A solid grounding plate must be within 20 feet of the equipment. This will serve as a common point to bond the existing station to each rack of equipment. Exception to these guidelines may exist on a site-by-site basis due to existing local equipment variations; refer to the Site and Path Survey Report, Equipment Selection Report, and the installation document for exact equipment location and special power needs. If a site cannot meet the guidelines listed in the previous paragraphs of this paragraph, the region should notify the program office prior to equipment delivery and installation.

72. DELIVERY. The contractor shall notify the Government 2 weeks in advance of the equipment delivery date(s) to facilitate site access and directions. The contractor is contractually responsible for packing and shipping all equipment to the sites. The contractor shall be responsible for providing material handling equipment and other resources for the loading, blocking, and bracing of items to be shipped on carrier's equipment as well as onsite loading and transportation of personnel and material. Acceptance of site equipment will be Freight on Board (FOB) destination.

73. INSTALLATION PLAN. The contractor shall prepare an installation document containing all information pertaining to the installation of the equipment and initiation of its operation. Submission of the installation documents shall be made, by the contractor to the Government, 60 days prior to delivery of the equipment to each site. The Government will review the documents within 30 days, and the contractor shall incorporate any changes required by the Government. The final (approved) documents will be delivered at least 15 days before scheduled delivery of the first equipment. The installation documentation will include the following items:

a. Weight of each equipment rack and items within the rack.

b. Dimensions of each equipment rack.

c. Outline and configuration drawings.

d. Exact floor plans.

e. Additional ventilation, air flow, or cooling requirements.

f. Physical location of interfacing connectors, including terminal blocks, coaxial connectors, and waveguide connections.

g. Clearance factors for installation, maintenance, and cooling.

h. Power requirements for each primary power input circuit.

i. Heat dissipation for each equipment rack.

j. Concentrated and distributed floor loading, in lbs/sq. ft., of each equipment rack.

k. Listing of all equipment supplied by the contractor for a particular site.

l. Complete set of installation drawings showing interfacing connectors between racks of the TML, and interfacing with external equipment.

m. A list of cables, connectors, and waveguides required for installation, including type, size, function, source and destination.

n. Transport path analysis through the facility from the receiving dock to the installation site.

74. FIRST SITE VERSUS FOLLOW-ON SITE REQUIREMENTS. The FAA Technical Center shall be the primary Verification Test Site. This site shall be used to verify that the selected equipment is suitable for use with the DBRITE system. The final verification site shall be the keysite at Macon, GA. This site shall be used to verify that operational aspects of the fielded system are verified. During these tests, the contractor shall show that the TML is capable of transmitting a RS-343A signal from a DBRITE system to a tower display unit. The support required will be provided jointly by, ASM-200, ATR-100, ANA-1, SEI contractors, and Communications International Incorporated (CII). Discrepancies noted during execution of plans and procedures shall be corrected and follow-on sites will be promptly notified of the actions to be taken. The following plans and procedures will be validated:

a. Site shakedown test plan and procedures.

b. ORD test plan and procedures.

75.-79. RESERVED.

CHAPTER 8. VERIFICATION

80. FACTORY VERIFICATION. The T&E process by which the functional and operational performance of a system/subsystem is tested and evaluated in a systematic manner begins with factory verification testing. Since the TML equipment is commercial off-the-shelf, no design verification test is required. All equipment shall be tested at the manufacturer's site prior to shipment to ensure it is operating correctly, within manufacturer's specifications, and meets the requirements of FAA-E-2446B. This test was conducted by the contractor and witnessed by FAA personnel.

81. CHECKOUT. This is the first stage of site testing. The purpose is to ensure the operation of the TML hardware and consists of performing the CII installation and checkout tests.

82. CONTRACTOR INTEGRATION. This is a test of the TML hardware at the FAA Technical Center prior to delivery to the first operational site. Contractor integration testing at the FAA Technical Center verifies that the hardware performs in accordance with the requirements of the specification and the contract when placed in its intended operational environment. This test was accomplished using actual DBRITE video inputs. Further testing at the first operational site (Macon, GA) will be conducted to verify that the TML system performs successfully in a live environment.

83. CONTRACTOR ACCEPTANCE INSPECTION (CAI).

a. Contractor Checkout Testing. The purpose of this contractor conducted test is to ensure proper installation and operation of the TML system prior to the start of final acceptance testing. If this test should interfere with the location or operation of present equipment or ports, the contractor and site personnel will have to work together on a site-by-site basis to schedule the test during periods of minimum operational impact.

b. Site Acceptance Test. Following contractor checkout testing, an integrated site acceptance test with the contractor and FAA will be performed. The contractor will prepare pre-printed forms for acceptance check data (i.e., measurements and tolerances) in the acceptance test procedures for the Facility Reference Data File (FRDF). The specific timeframe for this testing event will be determined by the host site, as operations allow. Successful completion of the site acceptance test will signify FAA acceptance of the equipment at each site and departure of the contractor.

(1) System Acceptance. The FAA Form 256, Material Inspection and Receiving Report, shall be used by FAA for acceptance of the TML system. An FAA Form 256 is required for each destination of equipment at either host or satellite sites. The site TOR shall sign the acceptance block on the FAA Form 256 with return distribution to the FAA program offices, the contractor, and the local site. At this time, the TML equipment will be accepted by the

region. TML equipment missing or damaged during shipment, failing during installation or not being installed will be identified on the form following the warranty return procedures. The missing, damaged, or failing hardware will be replaced immediately by the contractor through express shipment or direct escort.

(2) Spares Acceptance. The site spares are tested and accepted by the Government (FAA Form 256) at the production factory and shipped with the TML equipment. The contractor will prepare pre-printed forms for acceptance check data (i.e., parameters and tolerances) in the acceptance test procedures for the FRDF. If necessary during site installation and testing, the contractor may use these spares to avoid delays. However, the failed items will be returned to the contractor. These spares will also be replaced immediately by the contractor through express shipment or direct escort.

84. FAA OT&E/INTEGRATION TESTING. These tests verify the integrity and interface of TML with the DBRITE equipment. With operations permitting, FAA sites should be ready to commission the TML at the conclusion of this phase. Similar to the installation contractor, the regions and sites must plan their activities with some flexibility if this goal is to be achieved. The contractor will work the necessary time schedules to help meet this goal.

85. OT&E/SHAKEDOWN. System shakedown testing occurs at the FAA Technical Center and at the keysite. Shakedown testing at the FAA Technical Center is for the purpose of ensuring, to the greatest extent possible, that the system/subsystem requirements of the NAS, including operational effectiveness and operational suitability are verified prior to delivery to additional operational sites. ASM-600 is responsible for developing a shakedown test plan and procedures for FAA Technical Center shakedown testing.

a. Shakedown Process. The TML system will be integrated into the DBRITE system. At the completion of FAA Technical Center and keysite shakedown the ANA-140 PM will present a report to the EXCOM DRR Board, recommending deployment to the remaining operational sites. Shakedown will be conducted for the 15 GHz and 8 GHz systems. If, at a later date, a requirement to deploy the 23 GHz radio is identified, shakedown would also be conducted on the first 23 GHz TML system deployed.

b. OT&E/Shakedown Activities. OT&E/shakedown is independent testing conducted by the FAA user organizations to verify the operational effectiveness and suitability of a subsystem in the NAS. OT&E/shakedown is intended to determine whether the personnel, operating procedures, and logistics are in place to support the TML subsystem. OT&E/shakedown activities will be accomplished in a simulated environment and at the keysite to evaluate the following:

(1) Operational and maintenance proficiency: site training, personnel readiness, training adequacy.

(2) Equipment performance: determination of reliability and maintainability, verification of system performance, failure mode analysis, failure detection and recovery, adequacy of all subsystems.

(3) Provisioning: ensuring the availability of field logistic support.

(4) Confirmation of completeness of "as built" drawings and instruction book page changes.

(5) Adequacy and suitability of procedures and operations.

86. JOINT ACCEPTANCE INSPECTION (JAI). Facilities receiving TML's are responsible for ensuring a JAI is conducted in accordance with Order 6030.45, Facility Reference Data File, for the purpose of determining that TML operation, maintenance and support is satisfactory and ready for commissioning. At this time, responsibility for the TML system hardware will be transferred from the region to the site. Every effort should be made to complete these activities prior to or during the site acceptance testing. The ORD determines and establishes the date on which a facility is to be placed into operational use. To accomplish the ORD the facility must satisfy installation, performance, operation, and maintenance criteria. The ORD is the culmination of the site shakedown activity. It formally documents that the facility, system, and equipment is ready to support the real-time ATC tasks and the readiness of personnel, procedures, and support services to support these tasks.

87.-89. RESERVED.

CHAPTER 9. INTEGRATED LOGISTICS SUPPORT

90. MAINTENANCE CONCEPT. TML maintenance is based on a two-level maintenance concept, site and depot. The maintenance program provides for Line Replaceable Unit (LRU) replacements onsite, with contractor repair service coordinated by exchange and repair through the FAA Logistics Center or other designated facilities. The maintenance program will be monitored throughout installation and initial operation to identify any potential changes that may be required. The minimum time between maintenance actions shall be no less than 6 months. The maximum time for scheduled preventative maintenance shall be no more than 2 hours per year for each terminal pair or each repeater site. The TML equipment shall have a mean time to repair of one-half hour or less, excluding travel and logistics time. The spares will include a spares kit for an entire path and the spares kit for a path will be delivered to the transmitter site by the contractor.

a. Site Maintenance. Onsite maintenance actions consist of the removal and replacement of items at the module or LRU level by FAA technicians. Within this concept, LRU's and their recommended sparing levels are identified for each site in the Spares Report, CDRL Item C001. Of the antennas, waveguide, and related equipment, the only equipment requiring onsite scheduled maintenance is the dehydrator. The site maintenance activity for the TML is as follows:

(1) Removal and replacement of defective LRU.

(2) Site spares (LRU's) are obtained from the spares kit (one set of spares for each TML path) placed at a location designated by the region.

(3) Repairable site spares are returned to the FAA Logistics Center or to the manufacturer for depot repair.

(4) Spares required to replenish the site spares kits are requisitioned from the FAA Logistics Center (AAC-400).

b. Depot Maintenance. Depot maintenance consists of the repair of repairable items to the piece part. Since the TML system is composed of commercial off-the-shelf (COTS) equipment, repairable items will be repaired by the equipment manufacturer. The FAA Logistics Center will ship the failed module(s) to the contractor. The Contractor will return each repairable item to a serviceable condition in accordance with FAA-STD-1293, Servicing Standards and Test Requirements for Ground Electronic Equipment, verify the repair by test, and ship the item to the designated recipient.

91. TRAINING. The Office of Training and Higher Education, AHT-1, in coordination with the operating services, provides overall training guidance and monitors accomplishment of training programs. CII subcontracted the training portion of the contract to Jordan De Laurenti, Inc. (JDL), an experienced Oklahoma based training company.

a. JDL will provide a Course Design Guide (CDG) for the maintenance course for Government review and approval.

b. After approval of the CDG, JDL will write and provide student and instructor course materials required for the maintenance course for Government review and approval.

c. JDL will also develop a system level instruction book in accordance with FAA-STD-2494. This will be a coordination document for the commercial manuals provided with the equipment. It will fully describe system design and function, centering on those aspects associated with subsystem interoperability and interface. It will include complete system diagrams developed to an accuracy level which would allow trained technicians to utilize the drawings in the course of system preventive and corrective maintenance activity, to include depot repair actions and site maintenance actions.

d. JDL will conduct one training course. All contractor-conducted training has been provided. FAA will provide a follow-on course. The DBRITE TML class will be one week for 40 hours. This course is designed for AF technicians who are responsible for the maintenance and repair of the TML equipment. This course consists of classroom theory of operation instruction, laboratory equipment performance checks and troubleshooting procedures. Performance will be measured by written and performance tests for both the classroom and laboratory instruction. Training will be conducted at the FAA Academy by qualified instructors. Three technicians from each installation site will be trained. This training will take place in a timeframe which supports TML system installations. The training prerequisite for this class will be: Directed Study Course, 44321, Common Microwave Communications Principles.

92. SUPPORT TOOLS AND TEST EQUIPMENT. The contractor shall provide a Tools and Test Equipment List (CDRL Item C008) which defines the equipment required to accomplish maintenance support actions for the TML system. The equipment required will also be included in the Logistic Support Analysis Record (LSAR) (CDRL Item C005) to be submitted prior to the provisioning conference. The tools and test equipment required for onsite support of maintenance actions will be provided to the sites before system deployment. This will include signal sources, power meters, and counters as appropriate to verify operation/repair of the TML. Distribution of test equipment will be one set of test equipment for each path unless the path encompasses two frequency ranges, in which case test equipment will be provided such that both frequencies can be maintained.

93. SUPPLY SUPPORT. The logistics milestones to provide for supply support are: 1) Logistic Support Analysis (LSA) Guidance Conference, 2) Provisioning Guidance Conference, 3) interim provisioning effort, 4) Delivery of LSAR data, and 5) The Provisioning Conference. The contractor will purchase all required site and depot spares. Site spares will be

physically delivered to preassigned work center locations, or, in specific instances, will be delivered to and held by remote sites.

a. Initial Support. The initial quantity and type of spare parts was determined at the Provisioning Guidance Conference. The contractor provided a recommended spares listing broken down by site and depot, parts peculiar and parts common. This list was validated by FAA Logistics Center personnel. Depot spares will be delivered to the depot concurrent with the first site delivery. Initial depot and work center (site) spares will be delivered concurrently with the delivery of the first system so that a minimum of 50 percent of the established initial depot spares level is on hand and a full complement of work center spares is on hand at the supporting work center prior to site activation. The contractor will have sufficient installation spares such that use of the site spares during initial installation will not be required.

b. Follow-on Support. The Provisioning Conference shall take place 30 days after all Site Equipment Selection reports have been approved. The conference shall determine what additional spares shall be required as a result of variations in equipment configurations, spares usage experience and after consideration of LSA output data. The conference will be held to finalize sparing levels for all system spares and to provision for adequate stock levels for those spares. Sixty days after the Provisioning Conference, the FAA Logistics Center will determine stock requirements for the sites and the depot per Order 4620.3C, Initial Support for New or Modified Equipment Installation.

c. Life Cycle Support. The TML system life is planned to be 10 years. A contractor repair service shall be provided to support system repair for 5 years after initial system deployment. There is a 12-month warranty on the TML equipment. The warranty period commences with the installation date or 90 days after the date of the original shipment, whichever is earlier. The warranty does not include: fuses, meters, lamps or connectors. ASM-200 is responsible for providing for the system maintenance for the remaining 5 years of the life cycle.

94. VENDOR DATA AND TECHNICAL MANUALS. The contractor will supply one set of commercial manuals for each piece of commercial off-the-shelf hardware provided as required in FAA-E-2446B. In addition, the contractor shall develop a system-level instruction book in accordance with FAA-STD-2494/b. This document shall be a coordination document for the commercial manuals provided with the equipment. It will fully describe system design and function, centering on those aspects associated with subsystem interoperability and interface. It will include complete system diagrams developed to an accuracy level which would allow trained technicians to utilize the drawings in the course of system preventive and corrective maintenance activity, to include depot repair actions and site maintenance actions.

95. EQUIPMENT REMOVAL. N/A.

96.-99. RESERVED.

CHAPTER 10. ADDITIONAL PROJECT IMPLEMENTATION PLAN ASPECTS

100. CONFIGURATION MANAGEMENT. All equipment will be commercial off-the-shelf. All components having the same manufacturer's part number shall be identical in form, fit, and function. Any changes in equipment during the life of the contract will require FAA approval (configuration changes will be addressed by the Maintenance Engineering (ME) CCB, and will ensure that compatibility with previous revisions is maintained. Configuration control of the TML system will be maintained by ASM-640. The microwave equipment shall be designed with replaceable plug-in modules and printed circuit cards. Functionally identical modules and cards shall be designed to permit maximum interchangeability. All plug-in modules and cards shall be marked as to location and no damage may be incurred from errors in replacement (blowing fuses is acceptable).

101.-199. RESERVED.

APPENDIX 1. TML PERSONNEL

1. TML PROJECT PERSONNEL.

ANA-400

ROBERT S. VOSS
PROGRAM MANAGER FOR TERMINAL
AUTOMATION ARTS IIA
800 INDEPENDENCE AVE. SW
WASHINGTON, D.C. 20591
202-267-8349

ANA-140

GLADYS L. CLAYTON
TECHNICAL OFFICER
800 INDEPENDENCE AVE. SW
WASHINGTON, D.C. 20591
202-267-8321

GAIL RAPER
ALTERNATE TECHNICAL OFFICER
MARTIN MARIETTA/WDC-V42
475 SCHOOL ST. SW
WASHINGTON, D.C. 20024
202-646-5941

ANA-140

R.L. KERCH
TML ENGINEERING SUPPORT
MARTIN MARIETTA/WDC-V42
475 SCHOOL ST. SW
WASHINGTON, D.C. 20024
202-646-5384

ACN-260

WAYNE BELL
TML TEST DIRECTOR
FAA TECHNICAL CENTER
ATLANTIC CITY
INTERNATIONAL AIRPORT
NEW JERSEY 08405
609-484-5271

ANS-420

MARK HOOVER
ASSOC.PROGRAM MANAGER
FOR LOGISTICS
800 INDEPENDENCE AVE. SW
WASHINGTON, D.C. 20591
FTS 267-5838
202-646-5838

MATTHEW CLARK
TML LOGISTICS SUPPORT
MARTIN MARIETTA/WDC-V51
475 SCHOOL ST. SW
WASHINGTON, D.C. 20024
FTS 967-6952
202-646-6952

AAC-485

JIM TRUE
FAA LOGISTICS CENTER REP.
MIKE MONRONEY AERONAUTICAL CTR
P.O. BOX 25082
M/S AAC-485A, HEADQUARTERS
OKLAHOMA CITY, OK 73125
405-680-7457

AHT-400

JANE S. MAY
TML TRAINING
NASSIF BLDG, PL-100
400 7th St. SW
WASHINGTON, D.C. 20590
202-366-7024

JIM STRNAD
TML TRAINING SUPPORT
MARTIN MARIETTA/WDC-V51
475 SCHOOL ST. SW
WASHINGTON, D.C. 20024
202-646-5466

AAC-944C

STEVE MASON
TRAINING-ARTS II UNIT
MIKE MONRONEY AERONAUTICAL CTR
P.O. BOX 25082
M/S AAC-944C
OKLAHOMA CITY, OK 73125
405-680-4857

KIM STANLEY
TML TRAINING
MIKE MONRONEY AERONAUTICAL CTR
P.O. BOX 25082
M/S AAC-944C
OKLAHOMA CITY, OK 73125
405-680-3693

ASU-350

RICHARD A. BAKER
CONTRACTING OFFICER
800 INDEPENDENCE AVE. SW
WASHINGTON, D.C. 20591
202-267-7049

OTTO GREIBEL
CONTRACT SPECIALIST
800 INDEPENDENCE AVE. SW
WASHINGTON, D.C. 20591
202-267-7385

AAC-445A

CHRIS BABCOCK
FAA LOGISTICS CENTER
ENGINEERING
MIKE MONRONEY AERONAUTICAL CTR
P.O. BOX 25082
M/S AAC-485A, HEADQUARTERS
OKLAHOMA CITY, OK 73125
405-680-5227

ASE-620

RONI GUCKIAN
ANA-100 CMO
MARTIN MARIETTA/WDC-V32
475 SCHOOL ST. SW
WASHINGTON, D.C. 20024
202-646-6976

ASM-645

JOE HOFFERT
MAINTENANCE SUPPORT
MIKE MONRONEY AERONAUTICAL CTR
P.O. BOX 25082
M/S ASM-645
OKLAHOMA CITY, OK 73125
405-680-5913

2. TML REGIONAL PERSONNEL.

AAL

LEONARD GRAU
AAL-454A
701 C ST. (BOX 14)
ANCHORAGE, AK
99513
907-271-5222

RAY BALLANTYNE
AAL-518
222 WEST 7TH AVE. #14
ANCHORAGE, AK
99513
907-271-5884

MIKE CHAMBERS
MARTIN MARIETTA-ATC
701 C ST.(BOX 14)
ANCHORAGE, AK
99513
907-271-5310

ACE

JEFF YARNELL
ACE-425
DOT-FAA
601 EAST 12th ST.
KANSAS CITY, MO
64106
816-426-5676

JOHN MINSHULL
ACE-512C
DOT-FAA
601 EAST 12th ST.
KANSAS CITY, MO
64106
816-426-3400

DAVE GIBSON
ACE-512C
DOT-FAA
601 EAST 12th ST.
KANSAS CITY, MO
64106
816-426-3400

SAM WALLING
MARTIN MARIETTA-ATC
DOT-FAA-NAS/SEIC
401 S. CLAIRBOUNE RD.
SUITE 100
OLATHE, KS
64106
816-426-6833

AEA

JOHN DONOHUE
AEA-452.2
JFK INT AIRPORT
FITZGERALD FEDERAL
BLDG.
JAMAICA, NY
11430
718-917-1884

FRANK STORR
AEA-520.1
JFK INT. AIRPORT
FITZGERALD FEDERAL
BLDG.
JAMAICA, NY
11430
718-917-1225

HOWARD SMITH
MARTIN MARIETTA-ATC
JFK INT. AIRPORT
FITZGERALD FEDERAL
BLDG.
JAMAICA, NY
11430
718-917-0378

AGL

CHUCK PERI
AGL-451
2300 EAST DEVON
DES PLAINES, IL
60018
312-694-7656

PHILIP REICHART
AGL-550.6
2300 EAST DEVON
DES PLAINES, IL
60018
312-694-7561

PAUL J MEYER
MARTIN MARIETTA-ATC
2300 EAST DEVON
SUITE 223
DES PLAINES, IL
60018
312-694-7783

ANE	BRUCE NG ANE-422N 12 NEW ENGLAND EXECUTIVE PARK BURLINGTON, MA 01803-5299 617-273-7271	DAN TURNER ANE-516 12 NEW ENGLAND EXECUTIVE PARK BURLINGTON, MA 01803-5299 617-273-7145	ROBERT POTTER MARTIN MARIETTA-ATC 12 NEW ENGLAND EXECUTIVE PARK BURLINGTON, MA 01803-5299 617-273-7240
ANM	JIM MUNDY ANM-455L 1601 LIND AVE. SW RENTON, WA 98055-4056 206-227-2971	BOB MILLS ANM-515 1601 LIND AVE. SW RENTON, WA 98055-4056 206-227-2515	KEN JACROUX MARTIN MARIETTA-ATC 1601 LIND AVE. SW RENTON, WA 98055-4056 206-227-2985
ASO	GLENN C. BEAUPRE' ASO-422 3400 NORMAN BERRY DR. EAST POINT, GA 30344 404-763-7371	HOWARD D. WARNOCK ASO-514.4 3420 NORMAN BERRY DR. EAST POINT, GA 30344 404-763-7488	DARRALL SALTER MARTIN MARIETTA-ATC 3420 NORMAN BERRY DR. SUITE 524 HAPEVILLE, GA 30344 404-761-6070
ASW	BILL KOLP ASW-421.2 (ASSOC PM) 4400 BLUE MOUND RD. FORT WORTH, TX 76193-0421 817-624-5474 JOE B. CREES MARTIN MARIETTA-ATC FORT WORTH, TX 76193-0400 817-624-5635	LARRY AVERETT ASW-455.7 (PROJ. ENG.) 4400 BLUE MOUND RD. FORT WORTH, TX 76193-0455 817-740-3187	LARRY PERKINS ASW-511C (AIR TRAF.) 4400 BLUE MOUND RD. FORT WORTH, TX 76193-0511 817-624-5516
AWP	JOHN J. SHEA AWP-422.42 15000 AVIATION BLVD LAWNDALE, CA 90261 213-297-1079	CHRIS KLEEN AWP-512 15000 AVIATION BLVD LAWNDALE, CA 90261 213-297-1726	JOHN SEITZ MARTIN MARIETTA-ATC 15000 AVIATION BLVD LAWNDALE, CA 90261 213-297-0034

APPENDIX 2. APPLICABLE DOCUMENTS

1. GENERAL. The documents listed below form part of this order and are applicable to the extent described in this order.

2. GOVERNMENT DOCUMENTS. The version of the following Government documents, current on the date of the invitation for bids or requests for proposals, apply to this specification.

a. Specifications.

(1) Federal Specifications.

(a) FAA-E-2446B Television Microwave Link

(b) FAA-E-2478 Microwave Antenna Systems

(c) FAA-D-2706 Preparation and Validation of Theory Operations Examinations

(d) National Telecommunications and Information Administration Manual of Regulations and Procedures for Radio Frequency Management (NTIA Manual)

(e) Federal Communications Commission (FCC) Rules and Regulations, Part 2.

(2) Military Specifications.

(a) DOD-D-1000B Drawings, Engineering and Associated Lists

(b) MIL-E-17555 Electronic and Electrical Equipment, Accessories, and Repair Parts; Packaging and Packing of

b. Standards.

(1) Federal Standards.

(a) FAA-STD-013 Quality Control Program Requirements

(b) FAA-STD-019b Lightning Protection, Grounding, Bonding and Shielding Requirements for Facilities

(c) FAA-STD-020 Transient Protection, Grounding, Bonding, and Shielding Requirements for Equipment

(d) FAA-STD-028 Contract Training Program

(e) FED-STD-102 Preservation, Packaging, and Packing Levels

(f) FAA-STD-2494b Technical Instruction Book Manuscripts: Electronic Equipment,Requirements for

(2) Military Standards.

(a) MIL-STD-129 Marking for Shipment and Storage

(b) MIL-STD-470A Maintainability Program Requirements (For Systems and Equipment)

(c) MIL-STD-499A Engineering Management

(d) MIL-STD-785B Reliability Program for Systems and Equipment Development and Production

(e) MIL-STD-794 Parts and Equipment, Procedures for Packaging and Packing of

(f) MIL-STD-881 A Work Breakdown Structure for Defense Material Items

(g) MIL-STD-1189 Standard Department of Defense Bar Code Symbology

(h) MIL-STD-1388-1A Logistics Support Analysis

(i) MIL-STD-1388-2A DOD Requirements for a Logistics Support Analysis Record

(j) MIL-STD-1561B Provisioning Procedures, Uniform DoD

c. Other Publications.

(1) National Airspace Systems Integrated Logistics Support (NAILS) Master Plan, July 1986

(2) ORDER 1810.4A Test and Evaluation Program

(3) ORDER 6030.45 Facility Reference Data File

(4) ORDER 1800.63 NAS Deployment Readiness Review

(5) DOD-HDBK-472 Maintainability Prediction Notice 1

(6)	RS-195	Electrical and Mechanical Characteristics for Microwave Relay Systems Antennas and Passive Reflectors
(7)	RS-203	Microwave Transmission Systems
(8)	RS-250	Electrical Performance Standards for Television Relay Facilities
(9)	RS-235	Color Codes for Microwave Devices with Wire Leads
(10)	RS-343A	Electrical Performance Standards for High Resolution Monochrome Closed Circuit Television Camera